



Pa-hay-okee boardwalk provides sweeping views of "River of Grass".
DORIS E. CALL

Saving the Glades

A wood stork silently wades shallow waters like a drum major in slow motion. Bill submerged, its great dark head sweeps back and forth across shallow, murky waters. Look closely, because this dramatic wading bird is endangered. Its significant decline symbolizes the magnitude of environmental threats stalking today's Everglades. "River of Grass" was the description affixed to this gently sloping landscape in the 1940s by pioneering conservationist Marjory Stoneman Douglas. Within the park this river still flows slowly toward bay and gulf. Its grandeur is now severely threatened, however, and the death of the Everglades could occur. This is the first national park created to protect a threatened ecological system.

South Florida surfaced only since the Ice Age. The rock beneath this park is just 6,000 to 8,000 years old and in its infancy. Nowhere in the park does the landscape top eight feet above sea level. And this subtropical region enjoys no source of water but the rains that fall on it. The same rains that fall on south Florida today once ran off the backs of our wood stork's forebears, but the similarity ends there. Now, extensive canal and levee systems shunt off much of the life-giving bounty of the rain before it can

reach Everglades National Park. At times water control structures at the park boundary are closed and no water nourishes the wood stork's habitat. Or, alternately, water control structures are opened and human-managed floodwaters inundate Everglades creatures' nests or eggs and disperse seasonal concentrations of the wading birds' prey. Added to these problems is the presence of pollutants from agriculture and other human activities. Waters from agricultural runoff affect vegetation patterns unnaturally. High levels of mercury are present at all levels of the food chain, from the fish in the marsh, through raccoons and alligators, to the Florida panther, a species so endangered that fewer than 10 persist in the park. One panther found dead in the park contained mercury levels that would be toxic to humans. Everglades alone among U.S. national parks holds three international designations: International Biosphere Reserve, World Heritage Site, and Wetland of International Importance. But how much longer will "River of Grass" remain an apt description?

After years of drainage and alterations, efforts to save the remaining Everglades and restore some semblance of their original function are underway.



We Need Water!

National parks are not islands of land; outside events can shape their fates. Water management is the critical issue for the Everglades, whose watershed begins in central Florida's Kissimmee River basin. Summer storms flooding there once started a shallow, wide river flowing southward to the Gulf of Mexico. Elaborate water controls now disrupt the natural flow. Short of clean water at critical seasons, and in the correct quantities, the Everglades will die.

In 1989 Congress extended the park's eastern boundary to protect the eastern Shark River Slough, historically one of the most important areas sustaining the park's biological abundance and diversity. Since then, in the Comprehensive Everglades Restoration Plan, Congress has authorized the world's largest environmental restoration project. Requiring 30 years to accomplish, this plan seeks to return water to more natural patterns of quantity, timing, and distribution throughout the south Florida ecosystem. Federal and state funds will support this unprecedented effort. As waters return to the natural system, it will also be important to address serious water quality issues. Created in 1947, the park was established to save a portion of the Glades, but its future depends on a healthier and more naturally functioning ecosystem in the entire region, where a burgeoning human population thirsts for the same water that wood storks need to survive. We must construct a balance among competing demands of urban, industrial, and agricultural development, with a restored Everglades as a centerpiece. Nothing is yet saved for good; the Everglades' fate remains our mandate.

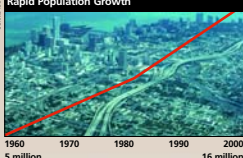
Threats to the Park

Regional Growth

Development of South Florida has made people and the Everglades ecosystem competitors for a finite water supply. Today, 900 people move to Florida daily; 39 million people vacation here some years; 12 million come in winter's dry

season as water supplies naturally drop. The historic Everglades—four-fifths lies outside the park—feels this population pressure. Only California, New York, and Texas today outstrip Florida in population.

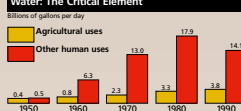
Rapid Population Growth



Demand for Water

Florida's daily population increase of 900 residents creates new demands to supply 200,000 more gallons of freshwater every day. Added square miles of building and paving reduce rainwater penetration into aquifers, the water-bearing layers

Water: The Critical Element



below ground that store water that wells may tap. Residents of Florida's west coast increasingly resort to drinking desalinated water. Freshwater sources there no longer suffice—even for piping practical distances. Agriculture not only makes demands on water supplies

but also threatens them. One dairy cow creates raw waste daily equivalent to that of 20 city residents. Varieties of agricultural runoff deplete water supplies with excess nitrogen, phosphorus, pesticides, herbicides, and fungicides. Depletion of fresh-

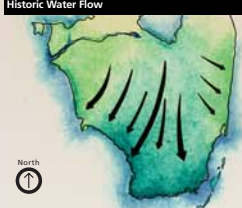
water supplies in coastal areas raises the specter of saltwater intrusions into inland aquifers. A freshwater head from rain normally creates a positive pressure that keeps saltwater out of coast aquifers. When freshwater supplies go way down, however,

saltwater can intrude, with dire consequences both for water supplies and the ability of soils to grow plants. Humans, of course, cannot drink saltwater, and it can destroy plumbing and appliances.

The Freshwater Cycle

South Florida's freshwater supply comes from rain on the Kissimmee River basin and southward, mostly between May and October. Evaporation, transpiration, and runoff consume four-fifths of the 40 to 65 inches per year. Slow and rain-driven, the natural cycle of freshwater circulation historically built up in shallow Lake Okeechobee. (It averages 12 feet deep and covers 730 square miles.) Thus began the flow of the

Historic Water Flow



50-mile-wide, shallow River of Grass. One to three feet deep in the slough's center but six inches deep elsewhere, it flowed south 100 feet per day across Everglades savgrass toward mangrove estuaries of the Gulf of Mexico. A six-month dry season followed. Everglades plants and animals are adapted to alternating wet and dry seasons. Water cycle disruptions ruin crucial feeding and nesting conditions.

The Threat of Fire



Fire's Historic Role

Everglades ecosystems evolved with natural fire and are adapted to its patterns. However, fire may pose new threats as water shortages make plants and soils newly vulnerable to more destructive burning.

Impact on Plants and Animals

Problems connected with the quality, quantity, timing, and distribution of water ripple throughout the Everglades. Numbers of wading birds nesting in colonies in the southern Everglades have declined 93 percent since the 1930s—from 265,000 to just 18,500. Endangered wood storks declined from 5,000 nesting birds in the 1960s to as few as 500 nesting birds in the 1980s. Also threatened are the rich Florida Bay nurseries for the state's shellfish industry.

Wet and Dry Seasons

Many animals are specifically adapted to the alternating wet and dry seasons. When human manipulations of the water supply are ill-timed with natural patterns, disasters can result. Alligators build their nests at the high-water level. If more water is released into the park, their nests are flooded and eggs destroyed.

Endangered snail kite birds feed on the aquatic apple snail. Low-water conditions, human-caused or natural, reduce snail and snail kite populations. In the early 1960s only 20 to 25 snail kites remained in North America because of prolonged drought. Snails lay eggs above water in the wet season. If managers release more water, snails fail to reproduce.

Exotics Invade

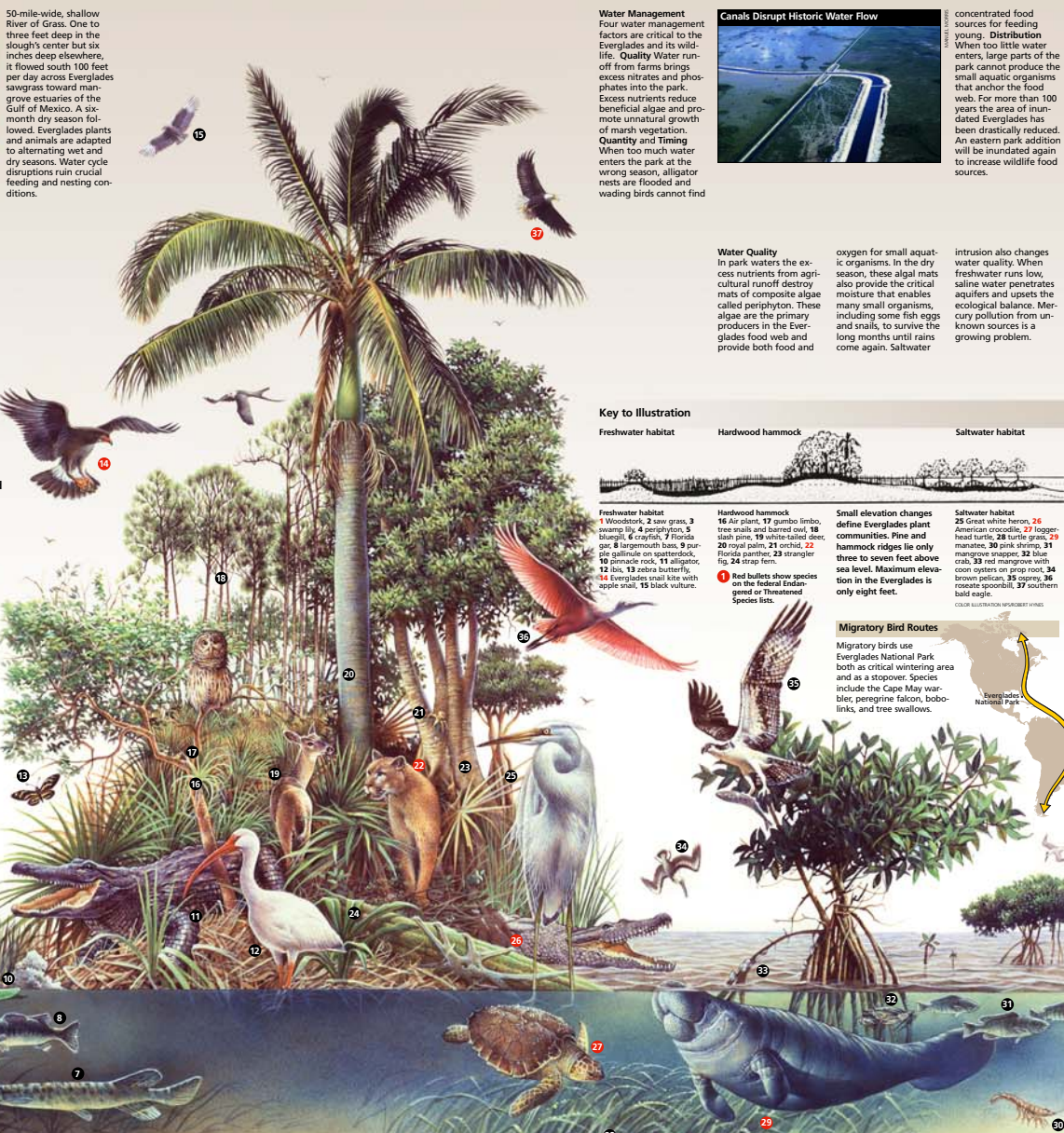
Native trees such as mangroves and cypress are being replaced by exotic (introduced) species from other countries. Florida largemouth bass share their nesting beds with tilapia and ocaris, fish imported from Africa and South America. As the Everglades yields to plants and fish introduced by humans, native species diminish.

The Wood Stork as Indicator

As a result of ecosystem changes, the wood stork was placed on the federal Endangered Species list in 1984. Its feeding behavior explains its predicament. Wood storks feed not by sight but by touch—"taco-location"—in shallow and often muddy water full of plants. Fish can't be seen in those conditions. Walking slowly forward the stork sweeps its submerged bill from side to side. Touching prey, mostly small fish, the

bill snags shut with a 25-millisecond reflex action, the fastest known for vertebrates.

Only seasonally drying wetlands concentrate—mostly in drying ponds—enough fish to provide the 440 pounds a pair of these big birds requires in a breeding season. When natural wetlands cycles are upset by human water management, wood storks fail to nest successfully.



Key to Illustration

Freshwater habitat Hardwood hammock Saltwater habitat

Freshwater habitat

1 Woodstork, 2 saw grass, 3 swamp fly, 4 periphyton, 5 bluegill, 6 crayfish, 7 Florida gar, 8 largemouth bass, 9 purple gallinule on spatterdock, 10 pinnaed reed, 11 alligator, 12 ibis, 13 zebra butterfly, 14 Everglades snail kite with apple snail, 15 black culture.

Hardwood hammock

16 Air plant, 17 gumbo limbo, tree snails and barned owl, 18 slash pine, 19 white-tailed deer, 20 royal palm, 21 orchid, 22 Florida panther, 23 strangler fig, 24 strap fern.

Saltwater habitat

25 Great white heron, 26 American crocodile, 27 loggerhead turtle, 28 turtle grass, 29 manatee, 30 pink shrimp, 31 mangrove snapper, 32 blue crab, 33 red mangrove with coon oysters on prop root, 34 brown pelican, 35 roseate spoonbill, 36 roseate spoonbill, 37 southern bald eagle.

Migratory Bird Routes

Migratory birds use Everglades National Park both as critical wintering area and as a stopover. Species include the Cape May warbler, peregrine falcon, bobolinks, and tree swallows.

